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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/696,349 | 10/29/2003 | Vladimir Grushin | PE0649USDIV2 | 6720 |
| 23906 | 7590 | 06/29/2005 | EXAMINER | |
| E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805 | | | KIELIN, ERIK J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2813 | |

DATE MAILED: 06/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

11A

Office Action Summary

Application No.

10/696,349

Applicant(s)

GRUSHIN ET AL.

Examiner

Erik Kielin

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/29/03 10/13/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 13 October 2004 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because some of the references have not been provided with dates in accordance with 37 CFR 1.98(b)(5). Also the MPEP 609 states,

“Each publication must be identified by publisher, author (if any), title, relevant pages of the publication, and **date** and place of publication. The date of publication supplied must include at least the **month and year** of publication, except that **the year of publication (without the month) will be accepted if the applicant points out in the information disclosure statement that the year of publication is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not in issue.**” (Emphasis added.)

The IDS has been placed in the application file, but only the references initialed by Examiner have been considered. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13-15 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/41512 A1 (**Thompson et al.**) in view of the article **Djurovich et al.** "Ir(III) cyclometalated complexes as efficient phosphorescent emitters in polymer blend organic LEDs" Polymer Preprints 41(1), 2000, pp. 770-771.

Thompson discloses the general formulas for electroluminescent metal complexes for use in the light-emitting layer of a light-emitting device, as $LL'L''M$ and L_2MX and L_3M , wherein M may be iridium (Ir) and each L, L', L'' are bidentate ligands of the variety shown in Fig. 39 and called "arylquinolines," and X is a bidentate ligand such as acetylacetonate (acac; Fig. 1) or hexafluoroacetylacetonate (p. 17). (See paragraph bridging pp. 3-4 and pp. 12 and 17). As shown in Fig. 39, each ring of the arylquinoline may be substituted with R, R', and R''.

The light emitting layers emit light in the range of 570 nm to 700 nm (pp. 34 and 35). Moreover, because the compounds disclosed are the same as those claimed, the emission is inherently within the claimed range; otherwise, claim 26 is would not be enabled by Applicant's own admission.

Because the light-emitting layer is the location where electrons and holes charges are transported to recombine with the emission of light. The light-emitting layer is a charge transport layer because the charges must move through the light-emitting layer in order to recombine.

Thompson does not indicate what are the substituents R, R', and R''.

Djurovich discloses electroluminescent Ir metal complexes having ligands also disclosed in **Thompson**. (Note that each of Thompson and Djurovich are common inventor/authors on

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each reference.) **Durovich** indicates that substituting the ring of the ligands with fluorine improves the solubility of the complex in the carrier matrix without much change to the emission spectrum (paragraph bridging pp. 770-771).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to have the substituents R, R', and R'' be fluorine in the arylquinoline rings of **Thompson**, in order to improve the solubility of the compounds for subsequent manufacture of the light-emitting device, as taught by **Djurovich**. Note that there exists no evidence of record that the location of the substituents on the ligands of the claimed compounds provides an unexpected result. Rather the instant specification and instant claim 21 broadly claims all locations on each ring are appropriate, thereby teaching away from unexpected results.

Further regarding claim 21, **Thompson** gives an exemplary amount of the Ir metal complex of 12% (Thompson, p. 30, for example.) While Thompson does not give amounts greater than 20%, this feature is *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use greater than 20% of the Ir metal complex in the light-emitting layer of **Thompson** in order to increase the total amount of light which can be emitted from the device.

3. Claims 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/41512 A1 (**Thompson et al.**) in view of the article **Dedeian et al.** "A new synthetic route to the preparation of a series of strong photoreducing agents: *fac* tris-othro-metalated complexes of iridium(III) with substituted 2-phenylpyridines" Inorganic Chemistry, Vol. 30, 1991, 1685-1687 in view of WO 00/70655 (**Baldo et al.**).

Thompson discloses the general formulas for electroluminescent metal complexes for use in the light-emitting layer of a light-emitting device, as $LL'L''M$ and L_2MX and L_3M , wherein M may be iridium (Ir) and each L, L', L'' are bidentate ligands of the variety shown in Fig. 39 and called "arylquinolines," and X is a bidentate ligand such as acetylacetonate (acac; Fig. 1) or hexafluoroacetylacetonate (p. 17). (See paragraph bridging pp. 3-4 and pp. 12 and 17). As shown in Fig. 39, each ring of the arylquinoline may be substituted with R, R', and R''.

The light emitting layers emit light in the range of 570 nm to 700 nm (pp. 34 and 35). Moreover, because the compounds disclosed are the same as those claimed, the emission is inherently within the claimed range; otherwise, claim 26 is would not be enabled by Applicant's own admission.

Because the light-emitting layer is the location where electrons and holes charges are transported to recombine with the emission of light. The light-emitting layer is a charge transport layer because the charges must move through the light-emitting layer in order to recombine.

Thompson does not indicate what are the substituents R, R', and R", but does indicate that the ligands in the complex tune the color of light emitted by the complex (paragraph bridging pp. 34-35).

Dedeian, like **Thompson**, discloses electroluminescent phenylpyridine ligands for Ir. **Dedeian** shows in the upper, right-hand corner of p. 1686, Table I, that the phenylpyridine can be substituted with, inter alia, fluorine and trifluoromethyl.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use trifluoromethyl and fluorine as the R, R', and R" substituents on the arylquinolines ligands because, as noted above, **Thompson** suggests using various ligands to modify the emission wavelength of the Ir metal complex, and **Dedeian** teaches the trifluoromethyl and fluorine are known substituent for ligands of Ir metal complexes. Importantly, the **Thompson** and **Dedeian** references share a common author, Peter Djurovich, such that one of ordinary skill would also be aware that each group of authors/inventors were aware that the substituents of F and CF₃ are known ligand substituents.

Dedeian does not locate the substituent groups F and CF₃ on the phenylpyridine ligands that match those selected locations of claims 12-17, but does show that the ligands can be placed anywhere.

Baldo, like **Thompson** and **Dedeian**, discloses substituted phenylpyridine ligands for Ir, and teaches that the substituent groups can be located in any position on either ring of the phenylpyridine ligand. **Baldo** indicates that moving the functional group beneficially "give different color emission," "different carrier transport," and "alter the emissive properties" (Baldo, pp. 14-15).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to locate the substituents of **Thompson** at each specific location on the arylquinoline ring to beneficially affect the emissive properties of the Ir complex, as taught to be beneficial in **Baldo**. Note that there exists no evidence of record that the location of the substituents on the ligands of the claimed compounds provides an unexpected result. Rather the instant specification and instant claim 21 broadly claims all locations on each ring are appropriate, thereby teaching away from unexpected results.

Further regarding claim 21, **Thompson** gives an exemplary amount of the Ir metal complex of 12% (Thompson, p. 30, for example.) While Thompson does not give amounts greater than 20%, this feature is *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use greater than 20% of the Ir metal complex in the light-emitting layer of **Thompson** in order to increase the total amount of light which can be emitted from the device.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent Application Publication 2003/0068526 A1 (**Kamatani** et al.) discloses the presently claimed compounds (Abstract; Tables 1-23).

US Patent Application Publication 2003/0072964 (**Kwong** et al.) discloses the presently claimed compounds (Figs. 3 and 4; paragraph [0149]).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 571-272-1693. The examiner can normally be reached from 9:00 - 19:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Erik Kielin
Primary Examiner
June 26, 2005